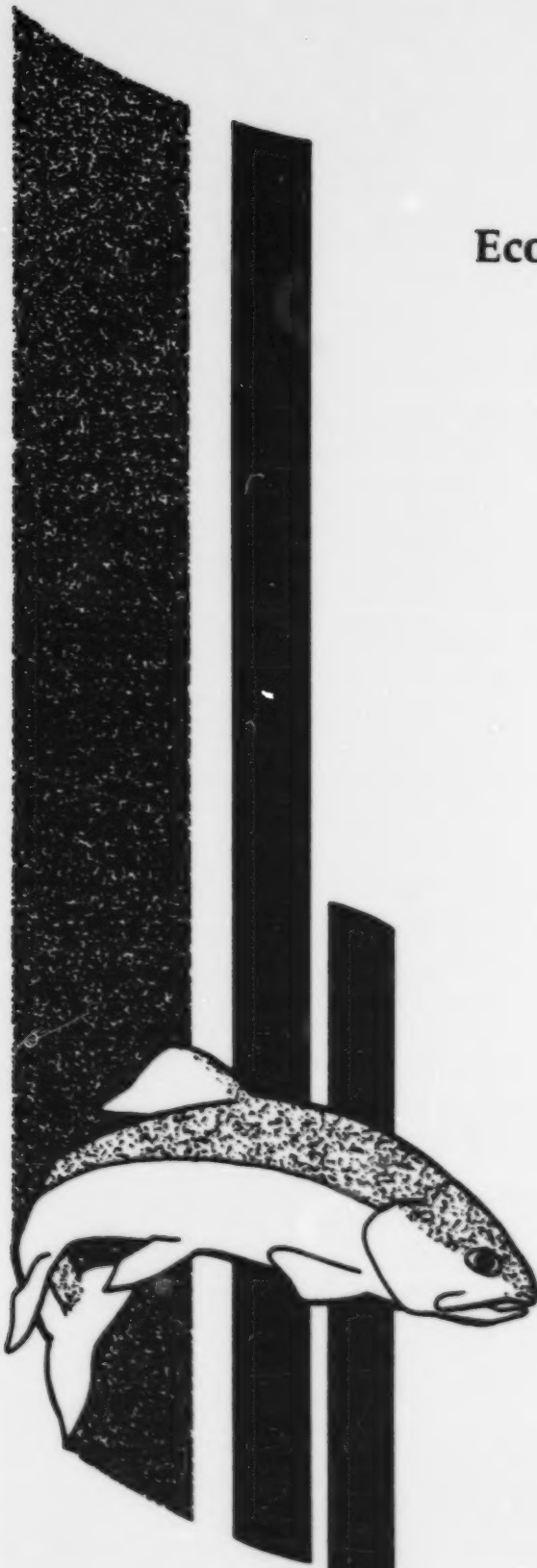




Economic Values and Impacts of Freshwater Sport Fishing in British Columbia

by

MICHAEL STONE

FISHERIES MANAGEMENT REPORT No. 91

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Province of British Columbia
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**ECONOMIC VALUES AND IMPACTS OF FRESHWATER SPORT FISHING
IN BRITISH COLUMBIA**

by

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ABSTRACT

Stone, Michael. Economic Values and Impacts of Freshwater Sport Fishing in British Columbia. 1988. Fisheries Management Report No. 91. 61 p.

British Columbia freshwater results of the 1985 National Survey of Sport Fishing in Canada were used to determine angler expenditures, economic impacts of these expenditures on the B.C. economy, and the net economic values that British Columbians derived from the freshwater sport fishery during 1985.

It is estimated that anglers spent a total of \$303.5 million in pursuit of their sport in British Columbia during 1985. Of this total \$144.1 million was spent on direct angling expenditures and \$159.4 million on capital equipment purchases attributable to sport fishing. Of the \$303.5 million total 86% was spent by residents of British Columbia and 14% by nonresidents.

Economic impacts were estimated using the angler expenditure data and the British Columbia Input-Output Model. It is estimated that angler expenditures during 1985 supported 5,238 person years of employment, \$110.5 million of household income and \$174 million of provincial gross domestic product. In addition, it is estimated that \$32 million of provincial government tax revenue was generated.

The value of British Columbia's freshwater sport fishery was calculated using the people of British Columbia as the referent group. This means that different methods had to be used to determine the value British Columbians derived from resident and nonresident angling. The value of resident angling was determined by estimating the consumer surplus values resident anglers derived from participating in their sport. It was estimated that the average value of a resident angler day was \$20.80 with a total value during 1985 of \$89.1 million. The value of nonresident angling was found by estimating the increase in provincial income resulting from the expenditures of nonresident anglers. The average value of a nonresident angler day was estimated to be \$24.40 for a total 1985 value of \$11.5 million. Together resident and nonresident angling provided British Columbians with an estimated net economic value of \$100.7 million during 1985. Note that this annual value represents the value of the freshwater sport fishery alone and not the total value of British Columbia's freshwater fish resources. Any commercial values or non-use values British Columbians derive from the fish resources would have to be included in order to determine the total value of the fish resources.

SECTION 1 INTRODUCTION

1.1 PURPOSE AND OUTLINE

The purpose of this report is to present estimates of the net economic value British Columbians derived from the freshwater sport fishery during 1985. In addition estimates of the economic impacts that anglers' expenditures had on the British Columbia economy are reported. The economic impacts estimated include the changes in total output, employment, household income, provincial gross domestic product, and provincial government tax revenue. It is hoped that the estimated economic values and impacts will provide fisheries managers with useful tools and insights for the management of the freshwater sport fishery.

This report has been organized into four sections. In the remainder of this section the 1985 National Survey of Sport Fishing in Canada is described. The National Survey was the instrument used to collect the data upon which the economic values and impacts presented in this report are based. A brief overview of the British Columbia freshwater sport fishery during 1985 based the National Survey results is also included. Section 2 describes the estimated expenditures of freshwater sport fishermen in British Columbia during 1985. The expenditure data is used in Section 3 to estimate the impacts of the sport fishery on the British Columbia economy. Section 4 starts with a discussion of economic values and how the value of non-market goods, such as recreational angling can be calculated. Estimates of the economic value of resident and nonresident angling are presented in turn. The section concludes with a discussion of the relationship between the economic value of sports fishing and the total value of British Columbia's freshwater fish resources.

1.2 THE 1985 NATIONAL SURVEY OF SPORT FISHING IN CANADA

The 1985 National Survey of Sport Fishing in Canada was a cooperative effort of the federal Department of Fisheries and Oceans and all provincial and territorial fisheries management agencies. In British Columbia the freshwater portion of the survey was done in cooperation with the Recreational Fisheries Branch of the Ministry of Environment and Parks. The 1985 survey was the third in a series of surveys undertaken every five years since 1975. The objective of the surveys is to provide fisheries managers and the public with consistent information on the state of the sport fishery and to identify any emerging trends in the fishery.

The freshwater portion of the survey was conducted by mail using a random sample of 1985 freshwater B.C. angling licence holders. Of the 360,139 basic angling licences sold during 1985 a sample of 2.4% or 8,668 licence holders was drawn. The sample was stratified by angler type, i.e. resident anglers, nonresident Canadian anglers and nonresident alien anglers. The resident angler sample was further stratified by the nine B.C.

resident areas shown in Figure 1-1. The stratifications were done to ensure that truly representative results could be obtained for anglers residing in each resident area. The survey had three mailings consisting of the initial questionnaire, a reminder post-card and a follow-up questionnaire to non-respondents which resulted in a response rate of nearly 60%. Further details of the survey design and response rate plus copies of the questionnaires used in the survey can be found in Stone (1988).

1.3 ANGLING ACTIVITIES IN BRITISH COLUMBIA

The following brief description of British Columbia's freshwater sport fishery during 1985 is given in order to provide a background on what it is that is being valued in this report. There were 360,139 licenced freshwater anglers in 1985 of which 314,262 or 87.3% were active. Of active anglers 242,701 were residents of British Columbia and 71,561 were nonresidents. The active nonresident anglers were split almost equally between nonresident Canadians and nonresident aliens. Active anglers spent a total of 4,754,000 days fishing in British Columbia's fresh waters during 1985. Resident anglers accounted for 4,281,100 angler days, or 17.6 days per angler, and nonresidents for 472,900 days, or 6.6 days per angler. It is estimated that 70% of angling effort took place on lakes and 30% on rivers and streams. The total number of fish caught during 1985 was 9,395,500 of which 5,815,400 were retained by the anglers. Rainbow trout was the species most preferred by anglers and accounted for 57% of total catch and harvest. The average success rate amongst anglers during 1985 was 1.98 fish per angler day. Further details concerning angling effort and harvest plus angler characteristics, preferences and trends can be found in Stone (1988).

Figure 1-1
ANGLING SURVEY REGIONS OF RESIDENCE, 1985



SECTION 2 EXPENDITURES ON FRESHWATER ANGLING

2.1 INTRODUCTION

Both the resident and nonresident questionnaires of the 1985 National Survey included questions on the anglers' expenditures in B.C. during 1985. However, before the expenditure data is presented it is important to clearly specify what the data does and does not represent. The expenditures by anglers does not represent the value of the freshwater sport fishery. Expenditures are the costs incurred by anglers to partake in their sport and are not the benefits derived by anglers from their participation in the sport fishery. The correct methods of valuing the fishery are presented in Section 4. However, expenditure data does give an indication of the importance anglers place on the fishery and provides the information by which the economic impacts the fishery had on the economy can be estimated, as is done in Section 3.

2.2 CAPITAL EQUIPMENT EXPENDITURES

In the expenditure portion of the survey respondents were first asked if they or any member of their households had made any major purchases or investments in British Columbia during 1985 relating in whole or in part to go freshwater sportfishing. If they had they were asked to record the amount of their purchases by the six expenditure categories shown in Table 2-1. They were also asked to estimate the percentage of the total purchase value they felt was attributable to freshwater sportfishing. From the responses to these questions the total capital equipment expenditures attributable to freshwater sportfishing in B.C. during 1985 was derived and the results are reported in Table 2-1.

Of the \$325 million anglers spent on capital equipment during 1985, \$159 million or 49% was attributable to sportfishing. Of the latter amount, resident anglers were responsible for 93% of the total and nonresidents for only 7%. The percentage distribution of the expenditures by equipment category is given in Figure 2-1. For resident anglers the equipment category with the largest share of capital expenditures was special vehicles followed by boating equipment and camping equipment. For nonresident Canadians the category with the largest share was land or buildings while nonresident aliens spent the most on special vehicles.

2.3 DIRECT ANGLING EXPENDITURES

The survey contained two questions on the expenditures of anglers while on fishing trips. The first questions asked if the respondents had taken any "package" or so-called all-inclusive fishing trips in B.C. during 1985 and if so how much was their total household cost. The second question asked respondents to estimate their total household costs on all other fishing trips in B.C. during 1985 and record the amount by 12 expenditure categories. Table 2-2 presents the results of the answers to both

TABLE 2-1
CAPITAL EXPENDITURES ATTRIBUTABLE TO SPORT FISHING, 1985
(Thousands of 1985 Dollars)

REGION OF RESIDENCE	CAPITAL EXPENDITURE CATEGORY						TOTAL AMOUNT	TOTAL PURCHASES TO SPORTFISHING (%)	
	FISHING EQUIPMENT	BOATING EQUIPMENT	CAMPING EQUIPMENT	SPECIAL VEHICLES	LAND OR BUILDINGS	OTHER EQUIPMENT			
Vancouver Island	1,237	2,358	1,646	3,620	351	1,829	11,040	25,214	43.8
Lower Mainland	3,429	6,843	7,890	14,044	12,419	1,055	45,681	98,237	46.5
Thompson-Nicola	1,149	4,613	3,834	4,981	1,551	293	16,421	26,797	61.3
Kootenay	1,329	6,155	5,142	4,459	1,166	391	18,642	43,889	42.5
Cariboo	658	2,111	1,218	2,454	758	178	7,377	18,457	40.5
Skeena	1,062	3,366	1,241	3,907	2,292	359	12,228	25,861	47.3
Omineca	1,059	4,091	2,709	4,738	184	249	13,029	22,386	58.2
Okanagan	1,323	4,924	5,429	8,117	75	448	20,316	36,924	55.0
Peace	326	978	642	1,475	256	96	3,772	8,802	42.9
Resident Total	11,572	35,438	29,751	47,796	19,052	4,897	148,506	306,566	48.4
Canadian Nonres.	670	2,256	2,800	125	3,437	216	9,504	16,339	58.2
Alien Nonres.	291	281	36	481	240	120	1,450	2,176	66.6
Nonres. Total	961	2,537	2,836	605	3,677	336	10,954	18,515	59.2
TOTAL	12,533	37,975	32,587	48,401	22,729	5,233	159,459	325,081	49.1

Source: 1985 National Survey of Sport Fishing in Canada.

FIGURE 2 - 1

**DISTRIBUTION OF CAPITAL EXPENDITURES ATTRIBUTABLE TO
FRESHWATER SPORTFISHING BY EQUIPMENT CATEGORY**

(% OF \$159,459,000)

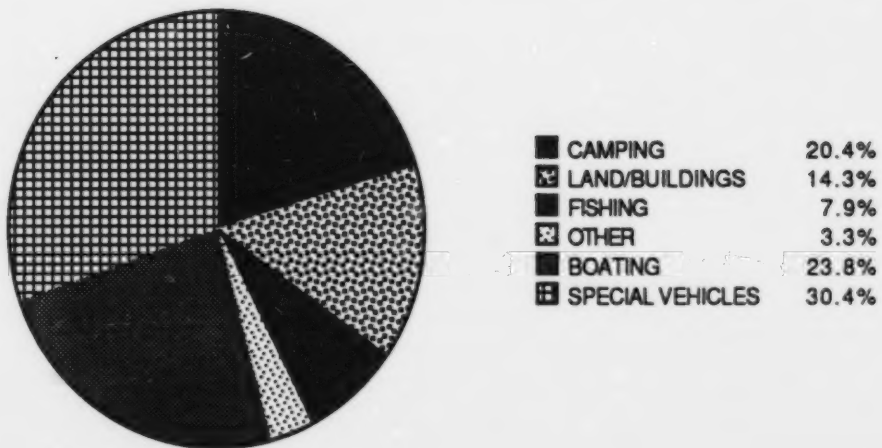


TABLE 2-2
DIRECT ANGLING EXPENDITURES BY EXPENDITURE CATEGORY, 1985
(1985 Dollars)

EXPENDITURE CATEGORY	EXPENDITURES BY			TOTAL	PERCENT OF TOTAL
	RESIDENT ANGLERS	NONRESIDENT CANADIANS	NONRESIDENT ALIENS		
Accommodation	3,621,900	1,118,400	2,450,100	7,190,400	5.0
Camp Site Fees	4,058,100	684,400	867,400	5,609,900	3.9
Groceries	26,949,500	2,299,300	2,285,300	31,534,000	21.9
Restaurants	4,545,200	1,421,600	1,682,100	7,648,900	5.3
Alcoholic Beverages	8,010,800	941,800	651,300	9,603,900	6.7
Travel Costs	42,134,800	3,459,300	4,430,100	50,024,100	34.7
Boat Rentals	1,606,600	272,000	401,400	2,280,100	1.6
Boat Operating Costs	9,019,600	463,500	242,700	9,725,800	6.8
Fishing Supplies	7,620,500	575,000	579,300	8,774,800	6.1
Guide Services	161,400	136,200	184,600	482,200	0.3
Licence Fees	3,250,900	462,700	601,800	4,315,400	3.0
Package Trips	1,273,700	673,400	4,387,500	6,334,600	4.4
Other Expenditures	323,700	79,700	149,000	552,500	0.4
TOTAL	112,576,800	12,587,300	18,912,500	144,076,600	100.0

Source: 1985 National Survey of Sport Fishing in Canada.

questions. Of the \$144 million spent during 1985 on fishing trips in B.C., residents accounted for 78% of total and nonresidents for 22%. Travel costs was the largest expenditure category followed by groceries which together accounted for 57% of total direct angling expenditures.

The direct angling expenditure patterns varied significantly between residents, nonresident Canadians and nonresident aliens. In particular nonresident aliens which accounted for only 13% of total direct angling expenditures accounted for 69% of total package trip expenditures and for 38% of total guide services expenditures. Not surprisingly nonresidents spent more proportionally on accommodation and restaurants than did resident anglers.

2.4 AVERAGE DAILY EXPENDITURES

A better way to examine angler expenditure patterns is to compare average expenditures per angler day as is done in Table 2-3 for both direct angling and capital expenditures. A comparison of average daily direct angling expenditures shows that nonresident Canadians spent almost twice as much as resident anglers and nonresident aliens spent over three times as much. As one would expect the average daily accommodation and restaurant costs of nonresidents were significantly higher than resident costs. For nonresidents, their average daily capital costs were much lower than their average daily direct angling costs especially for nonresident alien anglers. Surprisingly however, the average daily capital costs of nonresident Canadians was larger than for resident anglers, in part due to the large average daily cost of land or buildings.

Table 2-4 presents total expenditures, average annual expenditures per angler and average daily expenditures by the various regions of residence. Amongst resident anglers the residents of the Okanagan Region had the highest average daily expenditure followed by Lower Mainland Region residents while the residents of Vancouver Island had the lowest average daily costs. While nonresident anglers had higher average daily costs than resident anglers they had a much lower average annual cost due to the far fewer number of angler days nonresidents on average spend in British Columbia.

2.5 PACKAGE TRIPS AND GUIDING SERVICES

The National Survey included a question which asked anglers if they or any members of their family had purchased any "package" or so-called all-inclusive fishing trips, tours or outings in 1985. The question had four categories of package trips, fly-in, lodge, charterboat and other. For each category respondents were asked to indicate the management region in which the trip took place, the number of anglers from the household on the trip, and the total cost of the trip to the household. The results for all package trip types are presented in Table 2-5 and Figure 2-2 by the region fished. Residents comprised 45% of all anglers on package trips but accounted for only 20% of expenditures, while nonresident Canadians had 12% of anglers and 11% of costs and nonresident aliens had 43% of anglers and 69% of total costs. The average household cost per angler was \$199 for residents, \$404 for nonresident Canadians, \$727 for nonresident aliens, and

TABLE 2-3
AVERAGE DAILY EXPENDITURES BY EXPENDITURE CATEGORY, 1985
(1985 Dollars)

EXPENDITURE CATEGORY	EXPENDITURES BY			ALL ANGLERS
	RESIDENT ANGLERS	NONRESIDENT CANADIANS	NONRESIDENT ALIENS	
DIRECT EXPENDITURES				
Accommodation	0.85	4.60	10.66	1.51
Camp Site Fees	0.95	2.82	3.77	1.18
Groceries	6.29	9.46	9.94	6.63
Restaurants	1.06	5.85	7.32	1.61
Alcoholic Beverages	1.87	3.87	2.83	2.02
Travel Costs	9.84	14.23	19.28	10.52
Boat Rentals	0.38	1.12	1.75	0.48
Boat Operating Costs	2.11	1.91	1.06	2.05
Fishing Supplies	1.78	2.37	2.52	1.85
Guide Services	0.04	0.56	0.80	0.10
Licence Fees	0.76	1.90	2.62	0.91
Package Trips	0.30	2.77	19.09	1.33
Other Expenditures	0.08	0.33	0.65	0.12
TOTAL DIRECT	26.30	51.78	82.30	30.31
CAPITAL EXPENDITURES				
Fishing Equipment	2.70	2.76	1.27	2.64
Boating Equipment	8.28	9.28	1.22	7.99
Camping Equipment	6.95	11.52	0.16	6.85
Special Vehicles	11.16	0.51	2.09	10.18
Land or Buildings	4.45	14.14	1.04	4.78
Other Equipment	1.14	0.88	0.52	1.10
TOTAL CAPITAL	34.69	39.10	6.31	33.54
TOTAL	60.99	90.88	88.61	63.85

Source: 1985 National Survey of Sport Fishing in Canada.

TABLE 2-4
EXPENDITURES MADE TO GO FRESHWATER ANGLING BY REGION OF RESIDENCE, 1985
(1985 Dollars)

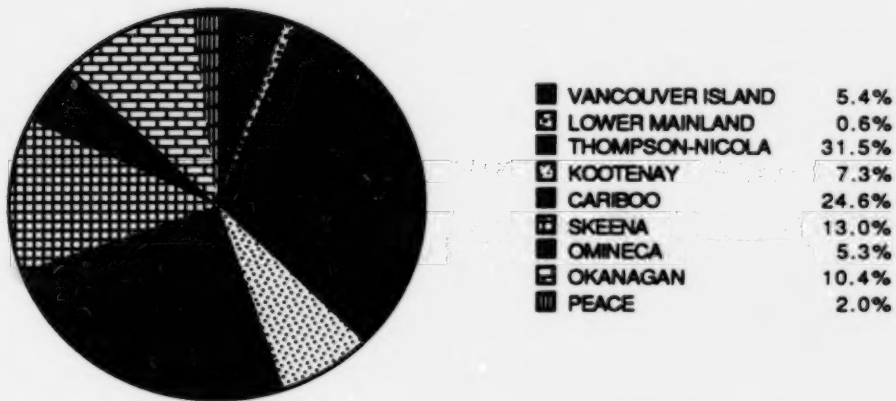
REGION OF RESIDENCE	TOTAL ANNUAL EXPENDITURE		AVERAGE ANNUAL EXPENDITURE PER ANGLER		AVERAGE EXPENDITURE PER ANGLER DAY	
	Direct	Capital Total ('000 \$)	Direct	Capital Total	Direct	Capital Total
Vancouver Island	9,113.4	11,040	20,153.4	408	495	903
Lower Mainland	33,307.7	45,681	78,988.7	418	573	991
Thompson-Nicola	12,990.9	16,421	29,411.9	480	607	1,087
Kootenay	13,378.0	18,642	32,020.0	546	761	1,307
Cariboo	6,568.9	7,377	13,945.9	493	554	1,047
Skeena	6,877.1	12,228	19,105.1	465	827	1,292
Umineca	10,821.5	13,029	23,850.5	604	728	1,332
Ukanagan	15,593.0	20,316	35,909.0	466	607	1,074
Peace	3,924.3	3,772	7,696.3	405	390	795
Resident Total	112,576.8	148,506	261,082.8	464	612	1,076
Canadian Nonres.	12,587.3	9,504	22,091.3	351	265	617
Alien Nonres.	18,912.5	1,450	20,362.5	529	41	570
Nonres. Total	31,499.8	10,954	42,453.8	440	153	593
Total	144,076.6	159,459	303,535.6	458	507	966
					26.30	34.69
					51.78	39.10
					82.30	6.31
					66.61	23.16
					30.31	33.54
					60.99	63.85

Source: 1985 National Survey of Sport Fishing in Canada.

TABLE 2-5
HOUSEHOLD MEMBERS AND EXPENDITURES ON PACKAGE TRIPS, 1985

REGION FISHED	HOUSEHOLD MEMBERS	EXPENDITURES (\$)	REGION FISHED	HOUSEHOLD MEMBERS	EXPENDITURES (\$)
<u>Vancouver Island</u>	Res. 285	63,100	<u>Skeena</u>	Res. 424	201,600
	Can. 212	127,100		Can. 303	154,300
	Al. 259	89,400		Al. 1,103	1,440,400
	Total 756	279,600		Total 1,830	1,805,200
<u>Lower Mainland</u>	Res. 22	1,600	<u>Omineca</u>	Res. 385	107,400
	Can. 0	0		Can. 106	31,800
	Al. 63	3,500		Al. 254	112,900
	Total 85	5,100		Total 745	252,000
<u>Thompson-Nicola</u>	Res. 1,554	316,500	<u>Ukanagan</u>	Res. 870	53,000
	Can. 668	207,500		Can. 0	0
	Al. 2,219	1,014,700		Al. 596	423,400
	Total 4,441	1,538,700		Total 1,466	476,400
<u>Kootenay</u>	Res. 716	77,100	<u>Peace</u>	Res. 156	27,600
	Can. 207	30,000		Can. 57	5,700
	Al. 102	8,700		Al. 73	30,600
	Total 1,025	115,900		Total 286	63,900
<u>Cariboo</u>	Res. 1,993	416,800	<u>Province</u>	Res. 6,405	1,273,700
	Can. 114	117,000		Can. 1,667	673,400
	Al. 1,370	1,264,000		Al. 6,034	4,387,500
	Total 3,477	1,797,800		Total 14,111	6,334,600

**A - NUMBER OF ANGLERS
(% OF 14,111 ANGLERS)**



**B - EXPENDITURES
(% OF \$6,334,600)**

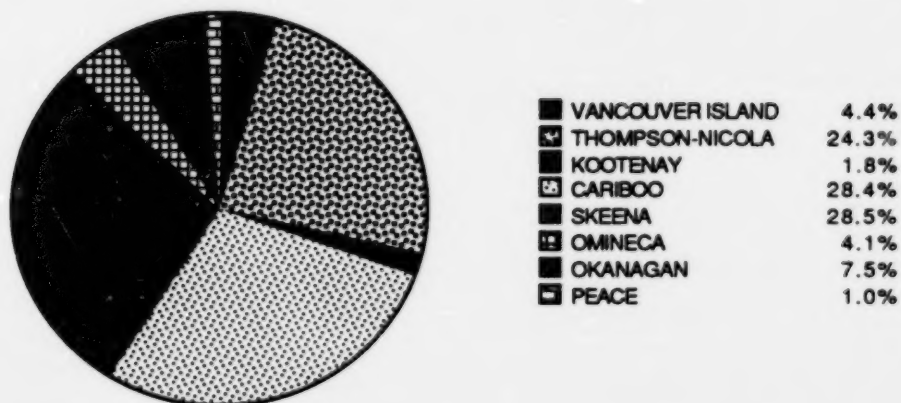


FIGURE 2 - 2

**DISTRIBUTION OF ANGLERS TAKING PACKAGE TRIPS BY
REGION FISHED, 1985**

\$449 for all anglers. Broken down by package trip category fly-in trips had 30% of anglers and 50% of expenditures, lodge trips had 37% of anglers and 38% of expenditures, charterboat trips had 11% of anglers and 5% of expenditures, and other trips had 23% of anglers and 7% of expenditures. Average package trip expenditure per angler by trip type was \$748 for fly-in trips, \$468 for lodge trips, \$200 for charterboat trips and \$145 for other trips.

In addition to the package trip expenditures anglers spent a further \$482,200 on guide services as reported in Table 2-2. Of this total 34% was spent by residents, 28% by nonresident Canadians and 38% by nonresident aliens.

2.6 MARKET VALUE OF SPORTFISHING EQUIPMENT

The National Survey also contained a question which asked respondents to estimate "the present market value of the sportfishing gear and equipment owned and used by you or members of your household solely for sportfishing." The results are presented in Table 2-6 without further comment.

TABLE 2-6
THE ESTIMATED MARKET VALUE OF THE SPORTFISHING GEAR AND EQUIPMENT
USED SOLELY FOR ANGLING BY B.C. RESIDENTS, 1985
(Thousands of 1985 Dollars)

REGION OF RESIDENCE	FISHING EQUIPMENT	BOATING EQUIPMENT	CAMPING EQUIPMENT	OTHER EQUIPMENT	TOTAL
Vancouver Island	10,543	34,989	31,863	6,446	83,841
Lower Mainland	29,574	79,522	76,206	31,556	216,859
Thompson-Nicola	10,489	30,966	33,311	12,031	86,797
Kootenay	10,158	44,255	43,963	12,470	110,846
Cariboo	5,501	18,575	17,339	3,493	44,907
Skeena	6,628	20,378	18,208	4,604	49,817
Omineca	6,964	30,088	31,895	7,509	76,456
Okanagan	11,074	42,796	44,836	11,121	109,828
Peace	2,563	10,086	15,241	1,454	29,344
Total	93,495	311,655	312,861	90,683	808,695

Source: 1985 National Survey of Sport Fishing in Canada.

SECTION 3 ECONOMIC IMPACTS OF ANGLING EXPENDITURES

3.1 INTRODUCTION

This section reports the method by which the economic impacts angler expenditures had on the provincial economy were estimated and the results of this estimation procedure. The economic impacts estimated include the impacts on total provincial output, household income, employment, provincial gross domestic product (GDP), and provincial government tax revenue. This section closes with a brief comment on the relationship between economic impacts and benefits.

3.2 ECONOMIC IMPACTS AND INPUT-OUTPUT ANALYSIS

Section 2 showed that anglers spent a considerable amount of money in pursuit of their sport during 1985 and one would expect that expenditures of this magnitude would have had a significant impact on the provincial economy. These economic impacts would include the employment, household income, provincial tax revenue, etc., generated by the angler expenditures. The economic impact of the expenditures on each of these items can be broken down into three components; the direct, indirect and induced impacts. The direct impacts of the angler expenditures are the employment, household income, etc., generated in businesses which directly supply anglers with goods and services. However, these businesses which directly supply the anglers must in turn purchase goods and services from other businesses and individuals, for example from wholesalers or manufacturers. This latter group of businesses provide intermediate inputs to those businesses which directly supply the anglers. The suppliers of intermediate inputs can be thought of as indirectly supplying the anglers. The indirect impacts of angler expenditures are the employment, household income, etc., created in businesses which supply intermediate inputs to those businesses which directly service the anglers. Finally, the household income generated directly and indirectly by angler expenditures would result in increased consumer spending which in turn would cause a further round of impacts on the economy. The induced impacts are the employment, household income, etc., generated by the increased consumer spending resulting from the direct and indirect impacts of angler expenditures on household income. The total impact of angler expenditures would be the sum of the direct, indirect and induced impacts.

As can be seen from the descriptions of the direct, indirect and induced impacts a considerable knowledge of industry structures and inter-industry dependencies would be required in order to estimate the economic impacts. Fortunately input-output models provide this information and the means of estimating the economic impacts of angler expenditures. At the heart of input-output models is a detailed set of industry accounting data which describes the flow of goods and services between the different sectors of the economy. Input-output models also consist of a set of mathematical equations which describe the relationships between these sectors. Together

the database and the equations can be used to estimate the impact a stimuli to the economy, such as angler expenditures, would have. A more thorough examination of input-output analysis, the means by which impacts are estimated, and the underlying assumptions of input-output models are contained in Appendix A.

The model used to estimate the economic impacts of angler expenditures was the British Columbia Input-Output Model of the Ministry of Economic Development. The impacts estimated by this model are the impacts on the British Columbia economy alone and exclude any impact the expenditures might have on the remainder of the Canadian economy. Appendix A provides a brief review of the British Columbia Input-Output Model and its major assumptions. Readers requiring further details of the model are directed to Central Statistics Bureau (1983 and 1986).

3.3 THE ESTIMATED IMPACTS

In order to estimate the economic impacts that angler expenditures had on the provincial economy the angler expenditures reported in Section 2, were assigned to input-output model commodity and final demand categories and applied to the British Columbia Input-Output Model. The assumptions used to assign the survey data to input-output model classifications are described in detail in Appendix B. The economic impacts estimated include the impacts on total output, household income, employment, provincial gross domestic product, and provincial government tax revenue.

Total Output

Table 3-1 reports the estimated impacts of angler expenditures on total provincial output. Note that the total angler expenditures of \$303.5 million generated only \$200.6 million of direct output. Much of what anglers purchase is produced in other countries or other parts of the country and the value of these imports must be deducted from total expenditures in order to derive the direct effect these expenditures have on provincial production. The indirect and induced impacts generated a further \$149 million in provincial output which together amounts to 74% of the direct impact. The total impact on provincial output was \$350.1 million.

Household Income

The estimated impacts of angler expenditures on household income are presented in Table 3-2. Angler expenditures are estimated to have generated \$110.5 million of household income in British Columbia of which 59% was a direct impact and 41% was indirect or induced. Resident expenditures generated 83% of the total while nonresident expenditures accounted for the remaining 17%.

Employment

The estimated provincial employment impacts of angler expenditures are reported in Table 3-3 which shows that 5,238.2 person years of employment were generated. The employment impacts are measured in person years which

TABLE 3-1
ESTIMATED IMPACTS OF ANGLER EXPENDITURES ON TOTAL PROVINCIAL OUTPUT
(Thousands of 1985 Dollars)

	IMPACTS ON TOTAL OUTPUT			
	DIRECT	INDIRECT	INDUCED	TOTAL
RESIDENT				
Direct Expenditures	85,302	34,899	26,347	146,548
Capital Expenditures	84,188	34,182	29,018	147,388
Total Expenditures	169,490	69,081	55,365	293,936
NONRESIDENT CANADIAN				
Direct Expenditures	9,886	4,137	3,326	17,349
Capital Expenditures	6,050	2,745	2,391	11,186
Total Expenditures	15,936	6,882	5,717	28,535
NONRESIDENT ALIEN				
Direct Expenditures	14,449	6,228	5,624	26,301
Capital Expenditures	748	308	244	1,300
Total Expenditures	15,197	6,536	5,868	27,601
ALL ANGLERS				
Direct Expenditures	109,637	45,264	35,297	190,198
Capital Expenditures	90,986	37,235	31,653	159,874
Total Expenditures	200,623	82,499	66,950	350,072

TABLE 3-2
ESTIMATED IMPACTS OF ANGLER EXPENDITURES ON HOUSEHOLD INCOME
(Thousands of 1985 Dollars)

	IMPACTS ON HOUSEHOLD INCOME			
	DIRECT	INDIRECT	INDUCED	TOTAL
RESIDENT				
Direct Expenditures	26,537	8,738	8,764	44,038
Capital Expenditures	27,637	10,812	9,652	48,102
Total Expenditures	54,174	19,550	18,416	92,140
NONRESIDENT CANADIAN				
Direct Expenditures	3,274	1,070	1,106	5,450
Capital Expenditures	2,309	830	795	3,934
Total Expenditures	5,583	1,900	1,901	9,384
NONRESIDENT ALIEN				
Direct Expenditures	5,077	1,662	1,871	8,610
Capital Expenditures	223	97	81	401
Total Expenditures	5,300	1,759	1,952	9,011
ALL ANGLERS				
Direct Expenditures	34,888	11,470	11,741	58,098
Capital Expenditures	30,169	11,739	10,528	52,437
Total Expenditures	65,057	23,209	22,269	110,535

TABLE 3-3
ESTIMATED IMPACTS OF ANGLER EXPENDITURES ON PROVINCIAL EMPLOYMENT
(Person Years)

	IMPACTS ON TOTAL EMPLOYMENT			
	DIRECT	INDIRECT	INDUCED	TOTAL
RESIDENT				
Direct Expenditures	1,317.9	445.4	426.4	2,189.6
Capital Expenditures	1,168.1	479.6	469.6	2,117.2
Total Expenditures	2,486.0	925.0	896.0	4,306.8
NONRESIDENT CANADIAN				
Direct Expenditures	183.7	54.4	53.8	291.9
Capital Expenditures	90.9	36.3	38.7	165.9
Total Expenditures	274.6	90.7	92.5	457.8
NONRESIDENT ALIEN				
Direct Expenditures	281.4	83.8	91.0	456.2
Capital Expenditures	9.2	4.3	3.9	17.4
Total Expenditures	290.6	88.1	94.9	473.6
ALL ANGLERS				
Direct Expenditures	1,783.0	583.6	571.2	2,937.7
Capital Expenditures	1,268.2	520.2	512.2	2,300.5
Total Expenditures	3,051.2	1,103.8	1,083.4	5,238.2

are equivalent to one person working for one year. However, since fresh-water angling is mostly a seasonal activity the total number of jobs created should considerably exceed the number of full year equivalents.

Table 3-4 presents the employment impacts broken down by twelve industry sectors. Not surprisingly the sector receiving the largest share of employment, almost 25% of the total, was wholesale and retail trade. The next three largest sectors are in order, other manufacturing, personal services, and other services.

Provincial GDP

Provincial gross domestic product (GDP) is a measure of the value of the final demand goods and services produced in British Columbia. GDP excludes the values of intermediate goods and services used in the production of the final demand goods and services as the value of intermediate goods is already incorporated into the price of the final demand goods and services. GDP is also a measure of the total value added at all steps in the production process. The term gross is used to indicate that depreciation expenses have not been netted out of the total. As shown in Table 3-5 angler expenditures supported an estimated \$174 million of provincial GDP of which \$93 million was direct and \$81 million was indirect and induced.

Provincial Tax Revenue

The final impact of angler expenditures estimated was the impact on provincial government tax revenue. The results are presented in Table 3-6. The tax revenue includes the provincial share of personal income tax and corporate income taxes plus provincial indirect taxes less subsidies. Note that the estimated provincial revenue from indirect taxes less subsidies was not the result of the B.C. Input-Output Model but instead was estimated by the author, the detailed calculation of which is presented in Appendix C. Included in the provincial indirect tax revenue are the revenues from the Social Service Tax, the Hotel Room Tax, the Gasoline Tax plus the net markup of the Liquor Distribution Branch on the sale of alcoholic beverages. However, it was not possible to estimate the indirect and induced impacts on provincial indirect taxes less subsidies. Total provincial revenue generated totalled \$32.2 million of which 63% was indirect taxes less subsidies, 31% was personal income tax and 6% was corporate income tax. Of the total provincial revenue impact 84% was direct, 8% was indirect and 8% was induced.

3.4 ECONOMIC IMPACT COEFFICIENTS

The estimated economic impacts presented in Tables 3-1 to 3-6 were used to produce the economic impact coefficients shown in Table 3-7. The estimated impact coefficients show the impact one dollar of angler expenditures on average had on the British Columbia economy during 1985. They were calculated by dividing the estimated impacts by total angler expenditures for each angler group. Note that the coefficients do not represent the estimated impact \$1 spent on travel would have, nor \$1 spent

TABLE 3-4
ESTIMATED EMPLOYMENT IMPACTS OF ANGLER EXPENDITURES BY INDUSTRY SECTOR
(Person Years)

INDUSTRY SECTOR	EMPLOYMENT IMPACTS			TOTAL
	DIRECT	INDIRECT	INDUCED	
Agriculture	36.6	92.7	44.4	173.7
Forestry	5.8	9.5	3.5	18.8
Fishing, Hunting and Trapping	1.0	8.2	3.0	12.2
Mining	0.4	15.3	2.1	17.8
Food and Beverages	124.3	20.8	38.7	183.7
Other Manufacturing	835.5	238.4	65.4	1,139.2
Construction	110.7	22.9	21.3	154.8
Trans., Storage and Comm.	174.8	157.4	111.5	443.6
Elec., Power, Gas and Other Util.	2.9	21.0	23.4	47.3
Wholesale and Retail Trade	899.2	108.7	292.5	1,300.4
Personal Services	591.8	52.0	306.5	950.2
Other Services	268.3	356.9	171.3	796.6
Total	1,051.2	1,103.8	1,083.4	5,238.2

TABLE 3-5
ESTIMATED IMPACTS OF ANGLER EXPENDITURES ON TOTAL PROVINCIAL GDP
(Thousands of 1985 Dollars)

	IMPACTS ON GDP			
	DIRECT	INDIRECT	INDUCED	TOTAL
RESIDENT				
Direct Expenditures	41,117	17,834	16,077	75,029
Capital Expenditures	35,454	15,779	17,707	68,941
Total Expenditures	76,571	33,613	33,784	143,970
NONRESIDENT CANADIAN				
Direct Expenditures	5,148	2,066	2,030	9,244
Capital Expenditures	3,117	1,267	1,459	5,843
Total Expenditures	8,265	3,333	3,489	15,087
NONRESIDENT ALIEN				
Direct Expenditures	7,874	3,043	3,432	14,349
Capital Expenditures	296	142	149	586
Total Expenditures	8,170	3,185	3,581	14,935
ALL ANGLERS				
Direct Expenditures	54,139	22,943	21,539	98,622
Capital Expenditures	38,867	17,188	19,315	75,370
Total Expenditures	93,006	40,131	40,854	173,992

TABLE 3-6
ESTIMATED IMPACTS OF ANGLER EXPENDITURES ON PROVINCIAL TAX REVENUE
(Thousands of 1985 Dollars)

	IMPACTS ON PROVINCIAL TAX REVENUE			
	DIRECT	INDIRECT	INDUCED	TOTAL
RESIDENT				
Personal Income Tax	4,954	1,753	1,660	8,267
Corporate Income Tax	744	432	458	1,634
Indirect Taxes Less Subsidies*	17,916	n.c.	n.c.	17,916
Total	23,614	2,185	2,118	27,817
NONRESIDENT CANADIAN				
Personal Income Tax	500	170	172	842
Corporate Income Tax	87	45	48	179
Indirect Taxes Less Subsidies*	1,372	n.c.	n.c.	1,372
Total	1,959	215	220	2,393
NONRESIDENT ALIEN				
Personal Income Tax	475	158	176	809
Corporate Income Tax	96	45	49	189
Indirect Taxes Less Subsidies*	955	n.c.	n.c.	955
Total	1,526	203	225	1,953
ALL ANGLERS				
Personal Income Tax	5,929	2,081	2,008	9,918
Corporate Income Tax	927	522	555	2,002
Indirect Taxes Less Subsidies*	20,242	n.c.	n.c.	20,242
Total	27,098	2,603	2,563	32,162

* Calculated by Author. See Appendix B.
n.c. - not calculated.

TABLE 3-7
ESTIMATED ECONOMIC IMPACT COEFFICIENTS FOR ANGLER EXPENDITURES
(Impact/\$1 Expenditure)

EXPENDITURE IMPACT ON	EXPENDITURE MULTIPLIERS			
	DIRECT	INDIRECT	INDUCED	TOTAL
OUTPUT				
Resident	0.649	0.265	0.212	1.126
Nonres. Canadian	0.721	0.312	0.259	1.292
Nonres. Alien	0.746	0.321	0.288	1.356
Total	0.661	0.272	0.221	1.153
HOUSEHOLD INCOME				
Resident	0.208	0.075	0.071	0.353
Nonres. Canadian	0.253	0.086	0.086	0.425
Nonres. Alien	0.260	0.086	0.096	0.443
Total	0.214	0.077	0.073	0.364
GDP				
Resident	0.293	0.129	0.129	0.551
Nonres. Canadian	0.374	0.151	0.158	0.683
Nonres. Alien	0.401	0.156	0.176	0.734
Total	0.306	0.132	0.135	0.573
EMPLOYMENT	(Person Years/\$100,000 Expenditure)			
Resident	0.95	0.35	0.34	1.65
Nonres. Canadian	1.24	0.41	0.42	2.07
Nonres. Alien	1.43	0.43	0.47	2.33
Total	1.01	0.36	0.36	1.73

on groceries, nor \$1 spent on any other single expenditure category. Instead the coefficients represent the impact \$1 distributed across all angler expenditure categories, in the same proportion as occurred during 1985, would have on the B.C. economy.

The impact coefficients can be used to compare the relative impact expenditures by the three angler groups had on the economy. An examination of Table 3-7 shows that nonresident alien angler expenditures had the largest relative impact followed closely by nonresident Canadian anglers. Resident expenditures had a significantly smaller relative impact. The differences in relative impacts can be attributed to the differences in the expenditure patterns of the three angler groups as shown by the breakdown of average daily expenditures in Table 2-3. Nonresident anglers spend relatively little on capital items and far more on the more labour intensive direct expenditure categories such as restaurant meals and accommodation.

The estimated impact coefficients may also be a useful tool for estimating expenditure impacts in other recreational fisheries studies where total expenditure data is available but not a detailed breakdown by expenditure categories. However, the use of these coefficients implicitly assumes that the expenditure pattern of anglers during 1985 will be the same for the study area in question. In addition in order to use the employment impact coefficient the researcher will have to ensure that the expenditure data has been converted to constant 1985 dollars in order to correctly estimate the employment generated. The conversion of expenditure data for the other impact coefficients would not be required.

3.5 ECONOMIC IMPACTS VERSUS ECONOMIC BENEFITS

The economic impacts of angler expenditures estimated in this section should not be interpreted as the economic benefits of the sport fishery. The economic benefits of the fishery would show the effect the loss of the fishery would have on the provincial economy. In the absence of the fishery it is more than likely that resident anglers would substitute other activities within the province in place of angling. This means that resident angler expenditures would not be lost to the economy but rather redistributed to other sectors of the provincial economy. However, in the absence of the fishery, it is more than likely that some or all of the nonresident angler expenditures would be lost to the provincial economy and the economic impacts associated with these lost expenditures should be considered as a benefit to the province. Thus, while the economic impacts presented can be used to show the importance of the fishery to the provincial economy, they do not represent the economic benefits of the fishery. The correct method of valuing recreational angling is discussed in the following section.

SECTION 4 THE VALUE OF FRESHWATER ANGLING

4.1 INTRODUCTION

The purpose of this section is to describe the methods by which the net economic value of a sport fishery can be determined and to present the results of using these methods to value British Columbia's freshwater sport fishery. First the methods used to value resident angling are discussed followed by the presentation of the 1985 resident angling values and a comparison of the values to previous estimates. Next the method used to value nonresident angling is discussed followed by the presentation of the 1985 nonresident angling values. It is necessary to use different methods to value resident and nonresident angling because we are trying to determine the value which British Columbians alone derive from the fishery. This section closes with a discussion of the total value of freshwater angling and a few words on the potential uses of the estimated values.

4.2 THE VALUATION OF NON-MARKET GOODS

Market goods, such as food, clothing or automobiles, are freely traded in established markets at market determined prices. Non-market goods, such as angling and other outdoor recreation activities, are by definition not traded within a market and usually have no price assigned to them. While the methods used to estimate the value of market and non-market goods differ greatly we are in both cases attempting to estimate the same thing: the net value consumers' derive from consuming the good. This net value is referred to by economists as the consumer surplus, and an understanding of the consumer surplus is required before the methods of its estimation for non-market goods can be discussed.

The development of the concept of consumer surplus starts with an understanding of the demand curve. Consider the hypothetical demand curve for a good shown in Figure 4-1. A demand curve shows the quantity of a good (Q) a consumer would buy at each different price level (P). For our hypothetical demand curve consumers would be unwilling to purchase any quantity of the good at a price greater than or equal to P_{max} as the price would be greater than the benefits the consumer would derive from consuming a unit of the good. On the other hand, if the good was provided free of charge, i.e. $P=0$, then the consumer would only want Q_s of the good at which point the consumer's demand for the good is completely satiated. The demand curve is downward sloping because as a consumer increases his consumption of a good from zero units the incremental or marginal benefit he derives from having a further unit of the good decreases. In other words he derives more satisfaction from the consuming of the first unit of the good than from the consuming of the second unit and more satisfaction from consuming the second unit than from consuming the third unit and so on. Naturally if he is deriving less and less satisfaction from each subsequent purchase of the good he should be willing to pay less and less for each subsequent unit of the good he consumes. If the market price for a good in

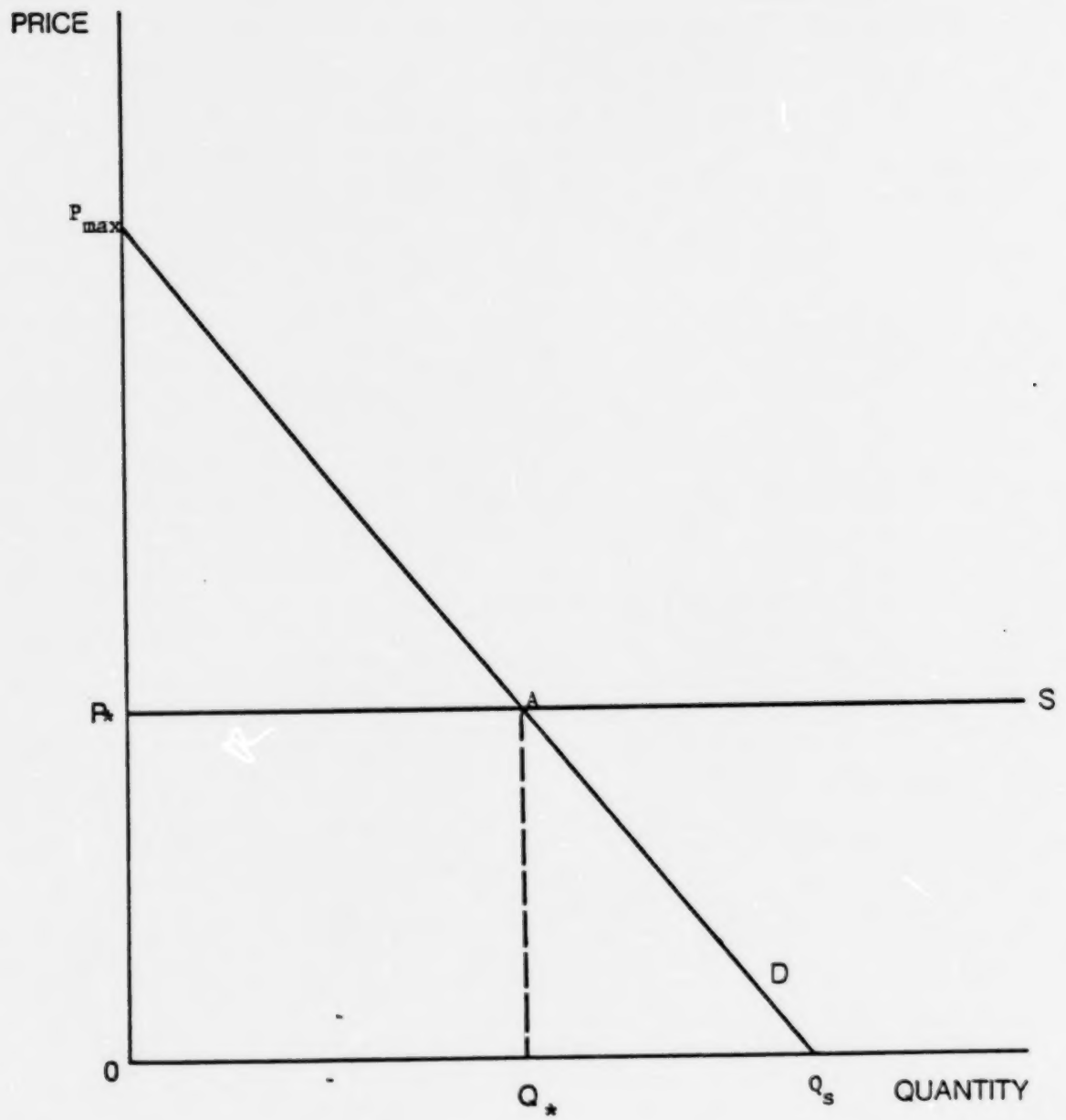


FIGURE 4-1
A HYPOTHETICAL DEMAND CURVE

Figure 4-1 is P_* then the consumer would purchase quantity Q_* of the good as the satisfaction derived from purchasing any more of product past Q_* would be less than the market price.

The demand curve shows the maximum amount a consumer would be willing to pay for each subsequent purchase of a good which is a monetary expression of the value a consumer derives from each purchase. The total value a consumer derives from his purchases would be equal to the area under the demand curve up to his purchase quantity. For example, if a consumer purchases Q_* of a good in Figure 4-1 then the total value derived by the consumer is equal to the area $O P_{max} A Q_*$. Note however that the consumer must pay an amount equal to $O P_* A Q_*$ in order to consume Q_* of the good. Therefore the net value the consumer receives is the difference of the two areas and is equal to the area $P_* P_{max} A$. This latter area is the net value of the good to the consumer and is referred to as the consumer surplus because it represents the surplus value the consumer receives above his payments for the good. For a non-market good which is not assigned a price a consumer would consume Q_s of the good. In this case his consumer surplus would be equal to the entire area under the demand curve or the area $O P_{max} Q_s$. The use of consumer surplus to value goods is not completely without controversy, Samuelson (1967) and Little (1960) are particularly critical of its use. However, the work of Willig (1976) has brought a general consensus on its applicability in economic analysis. Readers wishing a more detailed review of consumer surplus are directed to Currie et al. (1971) for a survey of the subject.

If the demand curve for a good was known then the calculation of the consumer surplus would be almost trivial, however the demand relationships are not known and must be estimated. Fortunately market goods provide market data by which demand curves can be statistically estimated. See Pindyck and Rubinfeld (1976) for a discussion of the statistical methods and problems of estimating demand relationships. Unfortunately non-market goods by definition do not provide the market data needed to estimate a demand curve so economists have had to develop alternative techniques in order to estimate the consumer surplus for non-market goods.

Two basic methods have been developed to estimate the consumer surplus derived from non-market goods such as outdoor recreation and angling; the travel cost method and the contingent value method. The travel cost method, which is also known as the Hotelling-Clawson-Knetsch method, attempts to simulate market data by using travel costs to and from recreation sites as a proxy for the price of the non-market recreation good. Using visitation rates and travel costs a demand curve for a trip to a recreation site can be estimated from which the consumer surplus can be measured. See Clawson and Knetsch (1966) for further details of the travel cost method. Donnelly et al. (1984) and Vaughan and Russell (1982) provide examples of applying the travel cost method to recreational angling.

The contingent value method, which is also known as the direct consumer surplus method, was first developed by Davis (1964). This method attempts to directly measure the value of the consumer surplus without first estimating the demand curve for the non-market good. In this method consumers are usually asked to state the maximum amount they would be

willing to pay for the good over and above the amount they already pay rather than do without the good in question. Their responses are estimates of their consumer surplus for the good. Examples of the use of the contingent value method in evaluating fish and wildlife resources in British Columbia can be found in Reid (1985a, 1985b, 1986), Reid et al. (1986) and Pearce and Laub (1969).

Critics of the contingent value method have stated that because the question put to consumers is hypothetical in nature the consumer responses are also hypothetical (Scott, 1965, p. 37). The concern is that the consumer responses may be biased due to a poorly designed question, incomplete knowledge of the question or because of strategic behaviour on the part of the respondent. The latter bias may arise if the respondents believe that over or under stating their true willingness to pay would benefit them. Reviews of the potential biases can be found in Schulze et al. (1981) and Rowe and Chestnut (1983). However, researchers have concluded that the contingent value method when used with a well designed survey instrument can provide unbiased estimates of the consumer surplus, for example Bohm (1972), Bishop and Heberlein (1979), and Brookshire et al. (1982).

4.3 RESIDENT ANGLING VALUES

The contingent value method was the valuation method chosen by the National Survey designers to determine the net economic value of sport fishing. The contingent value method was the most appropriate one to use because the designers were attempting to determine the value of an angler day in all of British Columbia and not any one specific site for which the travel cost method is better suited. Before the respondents were asked the willingness-to-pay question they were first asked about their capital and direct angling expenditures, the results of which were reported in Section 2. This ordering of the expenditure questions before the willingness-to-pay question served to orient respondents into thinking in monetary terms and to give the respondents a value they could relate to. The respondents were then asked:

"If your fishing costs had been higher in British Columbia due to increased costs for gasoline, accommodation, supplies and other services, at what additional daily cost would you have decided not to fish?"

Respondents were given a range of daily values between \$1 and \$100 per day to select from. By asking the willingness-to-pay question in terms of increased expenditures the question should avoid any strategic behaviour which might arise if the willingness-to-pay question had been worded in terms of an admission fee or a tax increase. Respondents' replies to this question are their estimated average consumer surplus value for a day of recreational angling in British Columbia.

Table 4.1 reports the average value of an angler day by the respondents' region of residence and also includes the average annual value derived by anglers from their angling experiences and the total value

TABLE 4-1
ESTIMATED NET ECONOMIC VALUE OF RESIDENT ANGLING BY RESIDENT AREA, 1985
(1985 Dollars)

REGION OF RESIDENCE	AVERAGE DAILY VALUE ¹	AVERAGE ANNUAL VALUE PER ANGLER ²	TOTAL VALUE (000's)
Vancouver Island	17.90	331	7,379
Lower Mainland	20.30	292	23,289
Thompson-Nicola	19.20	416	11,267
Kootenay	19.30	432	10,580
Cariboo	20.90	348	4,640
Skeena	23.10	513	7,591
Omineca	25.90	413	7,387
Okanagan	21.40	389	13,004
Peace	28.10	414	4,006
British Columbia	20.80	367	89,142

¹ Rounded to the nearest \$0.10.

² Rounded to the nearest dollar.

derived from freshwater angling by all residents in each region of residence. The average value for a day of freshwater angling in British Columbia during 1985 was \$20.80 and ranged from a low of \$17.90 in Vancouver Island to a high of \$28.10 in the Peace region. Even though the residents of the Skeena had a lower average value for an angler day than did residents of the Peace and Qmineca regions, they still had the highest average annual value due to the greater average number of days anglers from the Skeena fished. The total net economic value for freshwater angling in British Columbia during 1985 by resident anglers was \$89.1 million.

The results presented in Table 4-1 represent the values derived by anglers from each region of residence regardless of where they actually fished in British Columbia. It would be useful if the results by region of residence could be manipulated to determine the average daily value by the region fished. This can be accomplished if we make the simplifying assumption that an individual angler values a day fishing the same, regardless of which region he fished in during 1985. It is difficult to say how reasonable this assumption is. Fishing in regions outside the angler's region of residence will raise his travel costs and act to lower his consumer surplus, however, if the quality of fishing is better at the more distant site or the site is of greater scenic beauty then it would increase his consumers' surplus. It does seem reasonable to expect that an angler would not undertake a more distant fishing trip if the value to him of the trip was significantly less than the value of a trip in his home region. For this reason we will accept the simplifying assumption. The distribution of total values by the region fished can be determined by multiplying the number of angler days residents of a region spent in each region fished by the average daily value for that region of residence. Summing across all regions of residence will yield the total value for each region fished. Dividing the total value for each region fished by the total number of angler days spent in each region yields the average daily value by the region fished. The results of this allocation procedure are shown in Table 4-2.

The two previous National Surveys, conducted in 1975 and 1980, did not include a willingness-to-pay question so comparisons with our current survey results are not available from these sources. Fortunately, a provincial survey conducted in 1981 had a willingness-to-pay question as a major component of that survey (Reid, 1986). The 1981 provincial survey estimated the average value of an angler day in 1981 dollars to be \$20.10 and the total annual value of the resident angling to be \$113,335,000. These values can be inflated to 1985 dollars for comparison to our current results by using the consumer price index for Vancouver (Statistics Canada, 1986) which yields an average daily value of \$25.16 and a total annual value of \$141,895,000. The results from the 1985 national survey are considerably lower than the 1981 results; the average value of an angler day is 17% lower and the total annual value is 37% lower.

One possible cause for the difference in the results is measurement error in one or both of the surveys. However, both the 1981 and 1985 surveys had a large resident sample size, 9,946 and 6,945 licence holders

TABLE 4-2
ESTIMATED NET ECONOMIC VALUE OF RESIDENT ANGLING BY REGION FISHED, 1985
(1985 Dollars)

REGION FISHED	AVERAGE DAILY VALUE*	TOTAL VALUE (000's)
Vancouver Island	18.30	8,286
Lower Mainland	20.30	10,939
Thompson-Nicola	19.80	17,764
Kootenay	19.50	11,720
Cariboo	20.80	9,196
Skeena	23.10	8,983
Omineca	25.50	7,721
Okanagan	21.20	11,584
Peace	26.80	2,948
British Columbia	20.80	89,142

Source: 1985 National Survey of Sport Fishing in Canada.

* Rounded to the nearest \$0.10.

respectively, and a large number of respondents, 3,817 and 3,562 respondents respectively. The 1985 survey did have a higher response rate for residents at 56% than did the 1981 survey with 41%. Both surveys used the contingent value method to determine the value of an angler day and the wording of the willingness-to-pay questions used were very similar. Both surveys asked respondents to indicate their average daily willingness to pay values by checking one of twelve daily values which ranged from \$1 to \$100 per day and both surveys used the same nominal values for each of the twelve levels. However, inflation between 1981 and 1985, measured using the Consumer Price Index for Vancouver, was 24.2%. Therefore the real value of the ranges used in the 1985 survey were lower than those used in the 1981 survey which may have caused a downward bias in the 1985 results relative to the 1981 results. While the potential for measurement error in both surveys does exist the similarity in survey design and wording suggest that other factors should also be considered.

Economic theory and recent history offer several reasons for the precipitous drop in resident angling values. First, in 1981 the British Columbia economy was at a crest of economic growth which was shattered that year by a world-wide economic recession which caused sharp drops in natural resource commodity prices. The world recession hit British Columbia, and in particular the rural areas of British Columbia, which relies heavily on natural resources as the mainstay of our economy very hard. For example, per capita personal disposable income measured in constant 1981 dollars declined from its 1981 high point of \$10,985 to a low in 1983 of \$10,254, a drop of 6.7%. By 1985 income had risen to \$10,350 still 3.5% below the 1981 level.

In order to understand the effect a drop in income would have on the value of an angler day we must return to our analysis of a demand curve. The demand curve D_1 shown in Figure 4-2 shows the consumer's response to changes in the price of the good assuming that all other factors remain constant. Other factors which serve to determine demand in conjunction with the price of the good includes the price of other goods, the consumer's tastes and preferences and his total income to name but a few. When the price of the good changes the effect is movement up or down along the existing demand curve, however, if any of the other factors change then you have an inward or outward shift of the demand curve itself. Thus, income, tastes and preferences and the prices of other goods are known as demand shifters. If the good in question is a normal good then a decrease in income would cause an inward shift of the demand curve, say from D_1 to D_2 in Figure 4-2. The effect of this shift in the demand curve would be that for a given price P_* the consumer would decrease his consumption of the good from Q_1 to Q_2 . The inward shift of the demand curve obviously causes the area under it to decrease, therefore we have a drop in the consumers surplus from area $P_* P_1 A$ to area $P_* P_2 B$, a decrease equal to the area $P_2 P_1 AB$. We can conclude from this analysis that the drop in consumer income which took place in the first half of this decade would likely have resulted in a drop in the value of an angler day. Unfortunately without having first estimated the demand function for angling which includes income

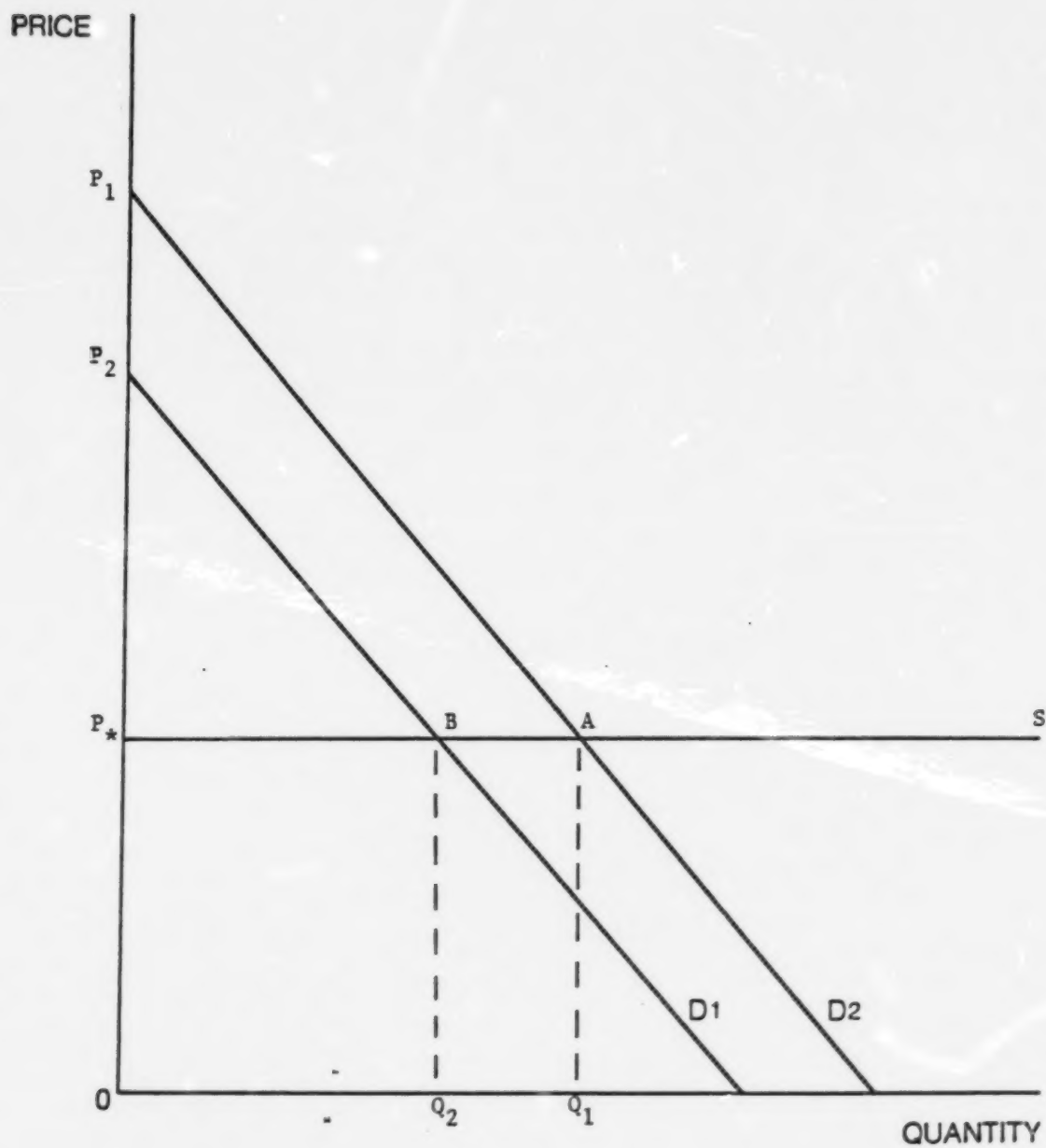


FIGURE 4-2
SHIFTS OF THE DEMAND CURVE

as an explanatory variable we cannot determine how much of the drop in the value of an angler day which occurred between 1981 and 1985 is attributable solely to the decline in consumer income.

A second possible cause for the drop in angling values was the shifts in population which took place in British Columbia between 1981 and 1985. Results from the 1986 Census shows that the population of British Columbia grew by 144,740 people or by 5.3% over the 1981 population. However, 92% of the population growth took place in the Greater Vancouver, Central Fraser Valley and Capital Regional Districts. These regional districts are located in regions which reported the lowest per capita participation rates in the freshwater sport fishery. The other 26 regional districts showed very modest population growth rates at best and in fact 12 of these regional districts, shown in Figure 4-3, experienced population declines between 1981 and 1986. These latter regional districts are in fisheries regions which had relatively high per capita participation rates. Speculation as to the reason for the disparity in population growth is that the decline in the resource sectors led to a move of people from rural areas to the major urban areas in search of employment.

A final factor which could have contributed to the decline in resident angling values was the doubling of angling licence fees which took place in 1982. The increase in fees coupled with the start of the recession led to a decline in resident licence sales from a high of 365,503 in 1981/82 to a low of 282,939 in 1985/86, a loss of 82,564 licenced anglers.

The factors listed above as the potential causes for the fall in resident angling values are no longer in decline themselves and a return to rising resident angling values may already be happening. Real per capita personal disposable income, which bottomed out in 1983, has been increasing although by the end of 1986 it still had not reached the 1981 level. Population forecasts for the province's rural regions show a return to population growth. Finally, the decline in resident licence sales stopped in 1986/87 when sales increased by 7,789 licences.

4.4 THE VALUATION OF NONRESIDENT ANGLING

The consumer surplus values derived by anglers from their angling experiences are often referred to in the literature as the primary benefits of the fishery. Nonresident anglers also derive primary benefits from their fishing experience in British Columbia but these nonresident primary benefits are not included in the valuation of the fishery because we are trying to determine the value which British Columbians alone derive from the fishery. While it may seem somewhat selfish to ignore the primary benefits derived by nonresidents it must be remembered that it is British Columbians who own the resource and it is their taxes which fund the management and regulation of the fishery. This is not to say that nonresident angling is totally without value to British Columbians. As shown in Section 2 nonresidents spent large sums of money while fishing in British Columbia which generated considerable additional income for British Columbians. This



FIGURE 4-3
 REGIONAL DISTRICTS HAVING POPULATION DECLINES 1981-1986

additional income generated by nonresident angler expenditures are the so-called secondary benefits of the fishery and will be the method by which nonresident angling is valued.

At this point readers may be confused as to why the secondary benefits of resident angler expenditures were not included in the value of resident angling. In the absence of the fishery it is more than likely that resident anglers would have pursued other recreational activities within British Columbia in place of their freshwater angling. As such their expenditures would not have been lost to the British Columbia economy. Therefore, while the secondary benefits of resident angler expenditures may have been shifted to different regions and sectors of the economy they would not have been lost to the British Columbian economy. Nonresident angler expenditures on the other hand represent an additional injection into the British Columbia economy due to the existence of the fishery and so the secondary benefits of their expenditures are included in the value of the freshwater sport fishery.

4.5 NONRESIDENT ANGLING VALUES

The secondary benefit of nonresident angler expenditures will be defined as the increase in provincial income due directly to the existence of the freshwater sport fishery. Provincial income includes household income, other operating surplus, provincial indirect taxes less subsidies and nonresident freshwater angling licence fees. Household income was defined earlier to include wages, salaries, supplementary labour income, and net income from farms and unincorporated businesses. Other operating surplus includes profits and investment income of incorporated business plus inventory valuation adjustments and capital consumption allowances. Indirect taxes include provincial revenue derived from the Social Service Tax, the Hotel Room Tax, the Gasoline Tax plus the net markup of the Liquor Distribution Branch on the sales of alcoholic beverages.

The value for the components of the secondary benefits of nonresident angler expenditures can be taken from the direct impacts estimated in Section 3. However, it would be incorrect to attribute all of the direct impacts solely to nonresident angling. In the absence of the freshwater fishery it is more than likely that some nonresident anglers would still have visited British Columbia and it would be inappropriate to attribute their expenditures to the freshwater sportfishery. Fortunately, the 1985 National Survey included a question for nonresident anglers asking if there had been no fishing opportunities in British Columbia freshwater in 1985 would they have stayed a shorter time, substituted other activities or not come at all. The expenditures of anglers who indicated that they would have substituted other activities represented 49.5% of total nonresident Canadian expenditures and 34.8% of nonresident alien expenditures and the impacts of these expenditures are not included in the value of nonresident angling. However, all nonresident angling licence fees were included in the secondary benefit estimates.

Table 4-3 presents the estimated benefits to British Columbians of nonresident angler expenditures. The nonresident freshwater fishery contributed \$11.5 million to British Columbia, 55% of which was due to

TABLE 4-3
ECONOMIC BENEFITS OF NONRESIDENT ANGLING, 1985
(Thousands of 1985 Dollars)

BENEFIT CATEGORY	NONRESIDENT CANADIAN	NONRESIDENT ALIEN	TOTAL
Household Income	2,819	3,456	6,275
Other Operating Surplus	1,181	1,691	2,872
Indirect Taxes Less Subsidies	693	623	1,316
Angling Licence Fees	463	602	1,065
Total	5,156	6,372	11,528
Average Daily Value*	21.20	27.70	24.40

* Rounded to the nearest 10¢.

nonresident aliens and 45% was due to nonresident Canadians. The average value of a nonresident angler day was \$24.40.

It would be useful to present the value of nonresident angling by the regions fished in British Columbia as was done for the value of resident angling. As the value of nonresident angling is based on nonresident angler expenditures it would seem reasonable to assign the total value of nonresident angling to each region fished based on the percentage of total expenditures attributable to each region fished. The assignment of expenditures to each region was based on the proportion of total angler days each angler spent in that region. Note that the expenditure need not have taken place in the region fished but is attributable to the fishing which took place in the region. Table 4-4 presents the estimated total value of nonresident angling during 1985 by the region fished as was determined using the assignment procedure outlined above. The regional total values were divided by the number of nonresident angler days spent in each region in order to determine the average value of a nonresident angler day for each region fished and the results are presented in Table 4-5.

4.6 THE TOTAL VALUE OF FRESHWATER ANGLING

The total value derived from the resident and nonresident freshwater sport fisheries during 1985 was \$100,670,000. This figure represents the annual net economic benefit British Columbians alone derive from the sports fisheries. However, the value does not represent the total value of British Columbia's freshwater fish resources but rather only the recreational angling use of these resources. In order to find the total value of the freshwater fish resources you would have to include the value of any commercial fisheries plus the non-use values British Columbians derive from the fish resources. The non-use values people derive from fish and wildlife resources have been categorized in the economic literature as preservation, bequest and option values (see for example Loomis et al., 1984 or Peterson and Sorg, 1987). Preservation, or existence, value is the economic benefit people derive simply from knowing the fish or wildlife resource is there. Bequest value is what the people would be willing to pay to ensure the resources are preserved for future generations. Option value is a premium people would be willing to pay to ensure the resource is there for their future use. Estimates of these non-use values can be substantial for example, Reid et al. (1986) estimated the annual preservation value for British Columbia's wildlife resources at \$105,758,000. The calculation of any commercial and non-use values of British Columbia's freshwater fish resources is beyond the scope of this paper but readers should be aware of these other values and not assume that the recreational angling values are the only values derived from the fish resources.

While the recreational angling values estimated in this section do not provide the total value of the fish resources they do provide the value of one component of the total value. As such they are an important tool for use in resource evaluation. The daily values can be used in the preparation of benefit cost analysis of major projects which may negatively impact fish habitat or in the preparation of compensation/mitigation claims for such projects that do go ahead. They should also be of benefit in the evaluation of fisheries enhancement and management projects.

TABLE 4-4
ESTIMATED TOTAL VALUE OF NONRESIDENT ANGLING, 1985
(Thousands of 1985 Dollars)

REGION FISHED	NONRESIDENT CANADIANS	NONRESIDENT ALIENS	ALL NONRESIDENTS
Vancouver Island	95	284	379
Lower Mainland	73	169	242
Thompson-Nicola	394	1,443	1,837
Kootenay	2,408	288	2,696
Cariboo	311	1,450	1,760
Skeena	420	1,830	2,250
Omineca	269	232	501
Okanagan	1,053	433	1,486
Peace	133	243	376
Total	5,156	6,372	11,528

TABLE 4-5
ESTIMATED DAILY VALUE OF NONRESIDENT ANGLING, 1985*
(1985 Dollars)

REGION FISHED	NONRESIDENT CANADIANS	NONRESIDENT ALIENS	ALL NONRESIDENTS
Vancouver Island	13.90	37.90	26.50
Lower Mainland	17.50	23.10	21.00
Thompson-Nicola	12.30	24.90	20.40
Kootenay	26.20	21.20	25.60
Cariboo	20.30	21.20	21.00
Skeena	16.00	38.40	30.40
Omineca	12.70	22.70	15.90
Ukanagan	32.80	34.40	33.20
Peace	9.90	54.00	21.00
Provincial Average	21.20	27.70	24.40

* Daily values have been rounded to the nearest 10¢.

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APPENDIX A INPUT-OUTPUT ANALYSIS AND THE BRITISH COLUMBIA INPUT-OUTPUT MODEL

A.1 INPUT-OUTPUT ANALYSIS

In this appendix the elements of input-output analysis, as developed by Leontief (1936), are explained. Also included is a brief description of the British Columbia Input-Output Model. Input-output analysis will be explained by the construction of an input-output model for a highly simplified hypothetical economy. For a more thorough treatment of the basics of input-output analysis see Miernyk (1965).

In our hypothetical economy we will assume that there are only two sectors, the business sector and the household sector, and that the government, import, and export sectors do not exist. The household sector provides labour and capital to the business sector in return for labour income and business surpluses. The household sector in turn uses its income to purchase goods from the business sector. The circular flow of income, goods, and services in our hypothetical economy is shown in Figure A-1 below.

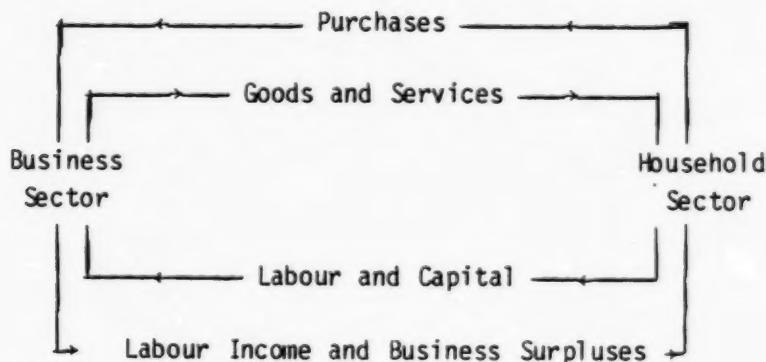


FIGURE A-1
INCOME FLOWS IN THE HYPOTHETICAL ECONOMY

We will assume that the business sector is made up of n industries with each industry producing only one specific type of good. Each industry sells its goods to the household sector, which we will call final demand, and to other industries which use the good as an intermediate input in the production of their own outputs. The demand by other industries will be referred to as intermediate demand. Obviously the total output from any industry i would be equal to the final demand for the good plus the sum of all intermediate demands of other industries or:

$$Y_i = X_i + \sum_{j=1}^n Z_{ij}, \quad (1)$$

where Y_i = total output by industry i ,
 X_i = final demand for the good produced by industry i ,
 Z_{ij} = intermediate demand by industry j for the good produced by industry i .

In order to produce its goods each industry must purchase labour and capital from the household sector plus any intermediate inputs required from the other industries. Stated mathematically we have:

$$Y_i = H_i + \sum_{j=1}^n Z_{ij} \quad (2)$$

where Y_i = total output by industry i ,
 H_i = labour income and business surplus payments to the household sector,
 Z_{ij} = purchases of intermediate inputs from industry j by industry i .

Because household payments includes any business surpluses the two equations (1) and (2) are equal or in other words, supply equals demand. Together equations (1) and (2) describe the flows of goods and income in our hypothetical economy and can be combined to form the transaction table shown below in Figure A-2.

FIGURE A-2
TRANSACTION TABLE FOR THE HYPOTHETICAL ECONOMY

	Intermediate Demand					Final Demand	Total Output
INDUSTRIES	Z_{11}	Z_{12}	.	.	Z_{1n}	X_1	Y_1
	Z_{21}	Z_{22}	.	.	Z_{2n}	X_2	Y_2
	.					.	.
	.					.	.
	.					.	.
	Z_{n1}	Z_{n2}	.	.	Z_{nn}	X_n	Y_n
Households	H_1	H_2	.	.	H_n		
Total Inputs	Y_1	Y_2	.	.	Y_n		

Summing along any row in Figure A-2 yields the total demand for an industry and is equivalent to equation (1). Similarly summing down any column gives the total inputs required by an industry and is equivalent to equation (2). Of particular interest in the transaction table is the upper left portion which describes the inter-industry flow of goods. Dividing the elements in each column j of the upper left hand portion by the total industry output Y_j yields a matrix (A) of technical coefficients a_{ij} where

$$a_{ij} = Z_{ij} / Y_j \quad (3)$$

Each technical coefficient a_{ij} specifies the amount of inputs required from industry i to produce \$1 worth of output from industry j . Rearranging terms in equation (3) gives

$$Z_{ij} = a_{ij} Y_j, \quad (4)$$

which can be substituted back into equations (1) and (2)

$$Y_i = X_i + \sum_{j=1}^n Z_{ij}, \quad (1)$$

$$Y_i = H_i + \sum_{i=1}^n Z_{ij}, \quad (2)$$

to yield

$$Y_i = X_i + \sum_{j=1}^n a_{ij} Y_j, \quad (5)$$

and

$$Y_i + H_i + \sum_{i=1}^n a_{ij} Y_i. \quad (6)$$

The effect any change in final demand has on total output from our economy can be described using these last two equations. If X_i increases in equation (5) then Y_i - total output for industry i will also increase. The effects on output, employment and income that the increase in final demand has on the industries which directly supply the goods and services are called the direct impacts of the increase in final demand. However this increase in Y_i means that more intermediate goods will be needed to produce the increase in Y_i , thus the increase of Y_i in equation (5) flows into the right hand side of equation (6) which shows the increase in total inputs required, Y_i , which in turn flows back into equation (5) and increases total output, Y_i , once again. The change in total output does not stop there. Instead the increase in demand for the intermediate inputs needed to produce the increase in X_i also require additional intermediate inputs in order to be produced, which causes a second loop through equations (5) and (6). This second loop causes a further increase in total output, although not as large as the first loop, and this process continues with the increases in total output getting smaller and smaller with each iteration until the increases in total output diminishes to zero. The sum of the loops through equations (5) and (6) caused by the initial increase in X_i is referred to as the indirect effect of a change in final demand. The total effect which a change in final demand has on our economy is the sum of the direct and indirect effects and shows the multiplier effect a change in final demand has on total output.

In order to expand our analysis from a single industry to all industries in our hypothetical economy it is notationally convenient to use matrix algebra.

Let:

Y = a vector of industry total outputs

$[Y_1, Y_2, \dots, Y_n]$

X = a vector of industry final demands

$[X_1, X_2, \dots, X_n]$

A = a matrix of technical coefficients

$$\begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & & \vdots \\ \vdots & \vdots & & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix}$$

Expanding equation (5) to include all industries yields

$$Y = X + AY \quad (7)$$

or total output from all industries is equal to total final demand for all goods plus total intermediate demand for all goods. Rearranging terms in equation (7) yields

$$Y(I-A) = X \quad (8)$$

$$Y = (I-A)^{-1}X \quad (9)$$

where I is an identity matrix with 1s on the main diagonal and zeros everywhere else and $(I-A)^{-1}$ is the inverse of $(I-A)$. Equation (9) is the one necessary to undertake input-output analysis because it expresses total output in our hypothetical economy in terms of final demand. Thus if we know how much final demand is going to change (ΔX) we can estimate how much total output will change (ΔY) or

$$\Delta Y = (I-A)^{-1} \Delta X \quad (10)$$

The matrix $(I-A)^{-1}$ is known as the impact matrix and is the heart of input-output analysis.

The change in total output is not the only thing which can be estimated using an input-output model. From additional coefficients, which can be calculated from the transaction table, the effect the change in total output has on household income, both labour income and business surpluses, can be estimated. In addition through the use of industry labour productivity coefficients the change in employment due to the change in total output can also be determined. The simple model described above can be extended to include a government sector plus import and export sectors, and the effects on these sectors can also be estimated.

In the model described above the effects which the increased household income generated by the change in final demand would have on the economy are not considered. Such a model is called an open model. The effects the increased household income would have on total output can be estimated by "closing" the model with respect to the household sector. In a closed model the household sector is incorporated into the technical coefficient matrix as if it were any other industry. With this accomplished the impact of increased household income, the so-called induced impact, can be estimated.

To this point our discussion of input-output analysis has focused on the construction of the model and on how the economic impacts are estimated. It is important at this point to discuss the important economic assumptions underlying the use of input-output models. The first important assumption is that all industries display constant economies of scale or, in other words, to double output you must double the use of all inputs. A second assumption is that there is no substitution in the production process between inputs. Economic theory suggests that if the relative price of one good rises then businesses would use less of the input and substitute other inputs in its place. Unfortunately input-output models assume a constant input mix. A third assumption is that there has been no technological change in the production technology of any industry since the model has been

estimated. Whether or not an input-output model with these assumptions provides an adequate approximation of how a real economy performs is an empirical issue. Proponents of input-output models conclude that they do.

A.2 THE BRITISH COLUMBIA INPUT-OUTPUT MODEL

The British Columbia input-output model was developed by the Ministry of Industry and Small Business Development, the forerunner to the current Ministry of Economic Development (Central Statistics Bureau, 1983). The model is a second generation input-output model based on rectangular matrices. The original square matrices models had as a basic assumption that each industry produced only one type of output. However, with rectangular models this assumption is relaxed. The additional computations required to calculate the impacts from rectangular models is beyond the scope of this paper and interested readers are directed to Statistics Canada (1982) and Central Statistics Bureau (1983 and 1986) for details.

The current British Columbia Input-Output model uses the following major assumptions when simulating the impacts on the provincial economy (Central Statistics Bureau, 1986):

- The technological coefficients are based on 1979 technology for producing goods and services in British Columbia.
- Relative prices have remained unchanged since 1979.
- The employment impacts are estimated based on labour productivity in British Columbia during 1979.
- The induced impacts due to the increases in household income are estimated based on:
 - household income is defined as wages, salaries, supplementary labour income and income of unincorporated businesses.
 - the marginal personal income tax rate is assumed to be 27%.
 - the average savings rate is assumed to be 13% of disposable income.
- The induced impacts do not include any effects which might arise from the increased revenue to incorporated businesses and government.

APPENDIX B

ASSIGNMENT OF EXPENDITURES TO INPUT-OUTPUT CATEGORIES

In order for the economic impacts of angler expenditures to be calculated the expenditures had to be assigned to input-output model categories. The British Columbia Input-Output Model has 595 commodity and 136 final demand categories (Central Statistics Bureau, 1986 p. 11 - 13). The purpose of this appendix is to describe how the angler expenditures described in Section 2 were assigned to BCIOM categories in order to calculate the estimated economic impacts presented in Section 3.

Table B-1 show how direct angler expenditures were assigned to input-output categories. For most of the angler expenditure categories their assignment to an input-output category was straightforward and unambiguous. For example, accommodation costs were assigned to input-output commodity category 569 accommodation services. However, for other survey expenditure categories the assignment is not straightforward and instead becomes somewhat arbitrary on the part of the researcher. This was particularly true for travel costs, household owned boat costs, and guide and package trip costs. Accordingly, household owned boat costs were arbitrarily assigned 80% to category 20026 - Gasoline, Oil and Grease and 20% to 551 - Repair Service. Travel cost had to first be assigned to a method of travel and then to a commodity category. Resident and nonresident alien travel costs were assigned 83% to travel by automobile or truck and 17% by air transportation. Nonresident alien travel costs were assigned 55% to travel by automobile or trucks and 45% by air transportation. Air transportation costs were next assigned to category 530 - Air Transportation and automobile and truck transportation was assigned 70% to 20026 - Gasoline, Oil and Grease, 15% to 20025 - Auto Repair and Parts, and 15% to 577 - Rental of Automobiles and Trucks. The assignment of guide expenditures and package trip expenditures was even more difficult because of a lack of British Columbia data on guide-outfitter operations. Fortunately a study of Saskatchewan guide outfitters, which are predominately fishing guides, was available (Topolniski et al., 1984). The Saskatchewan guide outfitter expenditure pattern shown in Table B-2 was used to break down guide and package trip expenditures and were assigned to input-output categories as shown in Table B-3.

Table B-4 gives the assumptions used to assign capital expenditures to input-output categories. Finally, Tables B-5 and B-6 give the results of assignment assumptions detailed above.

TABLE B-1
ASSIGNMENT OF DIRECT ANGLING EXPENDITURES CATEGORIES TO
INPUT-OUTPUT CATEGORIES

DIRECT EXPENDITURE CATEGORIES	INPUT-OUTPUT CATEGORIES
1. Accommodation	569 Accommodation Services
2. Campsite Fees	565 Other Recreational Services
3. Food - Groceries	20001 Food and Non-Alcoholic Beverages
4. Food - Restaurants	570 Meals
5. Food - Alcoholic Beverages	20002 Alcoholic Beverages
6. Travel Costs	20026 Gasoline, Oil and Grease 20025 Auto Repair and Parts 577 Rental of Automobiles and Trucks 530 Air Transportation (see text for method of allocation)
7. Boat Rentals	534 Services Incidental to Water Transportation
8. Household Owned Boat Costs	80% - 20026 Gasoline, Oil and Grease 20% - 551 Repair Service
9. Fishing Supplies	508 Sport Fishing and Hunting Equipment
10. Fishing Licence Fees	560 Government Royalty on Natural Resources
11. Guides	See Table B-2 and B-3
12. Package Trips	See Table B-2 and B-3
13. Other	20032 Recreational Services

TABLE B-2
SASKATCHEWAN OUTFITTER EXPENDITURE PATTERN, 1981

OUTFITTER EXPENSE ITEM	PERCENT OF TOTAL REVENUE
1. Cost of Retail Goods Sold	24.28
2. Direct Labour	10.00
3. Transportation	13.57
4. Property Operation/Maintenance	9.93
5. Energy	5.13
6. Vehicle	2.23
7. Miscellaneous Direct Expenses	0.45
8. Administration and General Expenses	1.42
9. Marketing	4.50
10. Indirect Labour	5.18
11. Insurance	1.63
12. Leases/Fees/Taxes	3.69
13. Miscellaneous Indirect Expenses	0.06
14. Interest	5.16
15. Share for Capital (less interest)	12.77
	<u>100.00</u>

Source: Topolniski et al., 1984, Table 11.

TABLE B-3
ASSIGNMENT OF OUTFITTER EXPENDITURES TO INPUT-OUTPUT CLASSIFICATIONS

OUTFITTER EXPENSE ITEM	INPUT-OUTPUT CLASSIFICATION
1. Cost of Retail Goods Sold	20032 Recreational Services
2. Direct Labour	599 Wages and Salaries
3. Transportation	530 Air Transportation
4. Property Operation/Maintenance	50% - 20001 Food and Non-Alcoholic Beverages 30% - 20002 Alcoholic Beverages 10% - 522 Repair Construction 10% - 587 Purchased Repair Service for Machinery
5. Energy	50% - 20010 Electricity 50% - 20012 Other Fuels
6. Vehicle	50% - 20026 Gasoline, Oil and Grease 50% - 20025 Auto Repair and Parts
7. Miscellaneous Direct	553 Retailing Margins
8. Administration and General	50% - 581 Office Supplies 25% - 552 Rental of Office Equipment 25% - 578 Trade Association Dues
9. Marketing	50% - 585 Travelling and Entertainment 50% - 586 Advertising and Promotion
10. Indirect Labour	599 Wages and Salaries
11. Insurance	556 Insurance and W.C.B.
12. Leases/Fees/Taxes	50% - 598 Other Indirect Taxes 50% - 566 Services to Business Management
13. Miscellaneous Indirect	550 Wholesaling Margins
14. Interest	554 Imputed Services Banks
15. Share for Capital (less interest)	40% - 601 Net Income Unincorp. Businesses 60% - 602 Other Operating Surplus

TABLE B-4
ASSIGNMENT OF CAPITAL EXPENDITURE CATEGORIES TO INPUT-OUTPUT CATEGORIES

MAJOR PURCHASE CATEGORY	INPUT-OUTPUT CATEGORY
1. Fishing Equipment	508 Sport Fishing and Hunting Equipment
2. Boating Equipment	352 Pleasure and Sports Craft
3. Camping Equipment	20030 Recreation, Sports and Camping Equipment
4. Special Vehicles	355 Trucks, Chassis and Tractors
5. Land - Buildings	50% - 523 Residential Construction 50% - 555 Other Real Estate and Financial Services
6. Other	184 Clothing

TABLE B-5
DIRECT ANGLING EXPENDITURES BY INPUT-OUTPUT CATEGORIES, 1985
(\$000's)

INPUT-OUTPUT COMMODITY AND FINAL DEMAND CATEGORIES	RESIDENTS	EXPENDITURES BY	
		NONRESIDENT CANADIAN	NONRESIDENT ALIEN
1. COMMODITY CATEGORIES			
508 Sport Fishing & Hunting Equip.	7,620.5	575.0	579.3
522 Repair Construction	14.3	8.0	45.4
530 Air Transportation	7,357.6	697.9	2,613.9
534 Services Incidental to Water Transportation	1,606.6	272.0	401.4
550 Wholesaling Margins	0.9	0.5	2.7
551 Repair Service	1,803.9	92.7	48.5
552 Rental of Office Equipment	5.1	2.9	16.2
553 Retailing Margins	6.5	3.6	20.6
554 Imputed Services Banks	74.0	41.8	235.9
556 Insurance and W.C.B.	23.4	13.2	74.5
560 Government Royalty on Natural Resources	3,250.9	462.7	601.8
565 Other Recreational Services	4,058.1	684.4	867.4
566 Services to Business Management	26.5	14.9	84.4
569 Accommodation Services	3,621.9	1,118.4	2,450.1
570 Meals	4,545.2	1,421.6	1,682.1
577 Rental of Automobiles and Trucks	5,245.8	430.7	365.5
578 Trade Association Dues	5.1	2.9	16.2
581 Office Supplies	10.2	5.7	32.4
585 Travelling and Entertainment	32.3	18.2	102.9
586 Advertising and Promotion	32.3	18.2	102.9
587 Purchased Repair Service for Machinery	14.3	8.0	45.4
598 Other Indirect Taxes	26.5	14.9	84.4
599 Wages and Salaries	217.8	122.9	694.0
601 Net Income Unincorp. Businesses	73.8	41.4	233.5
602 Other Operating Surplus	110.0	62.0	350.3
2. FINAL DEMAND CATEGORIES			
20001 Food and Non-Alcoholic Beverages	27,020.8	2,339.5	2,512.3
20002 Alcoholic Beverages	8,053.6	965.9	787.5
20010 Electricity	36.8	20.8	117.3
20012 Other Fuels	36.8	20.8	117.3
20025 Auto Repair and Parts	5,261.8	439.7	416.5
20026 Gasoline, Oil and Grease	31,711.9	2,389.8	1,950.8
20032 Recreational Services	672.1	276.3	1,259.1
TOTAL	112,576.8	12,587.3	18,912.5

TABLE B-6
CAPITAL EXPENDITURES ATTRIBUTABLE TO SPORT FISHING
BY INPUT-OUTPUT CATEGORIES, 1985
(\$000's)

INPUT-OUTPUT COMMODITY AND FINAL DEMAND CATEGORIES	RESIDENTS	EXPENDITURES BY	
		NONRESIDENT CANADIAN	NONRESIDENT ALIEN
<u>1. COMMODITY CATEGORIES</u>			
184 Clothing	4,897	216	120
352 Pleasure and Sports Craft	35,438	2,256	281
355 Trucks, Chassis and Tractors	47,796	125	481
508 Sport Fishing and Hunting Equipment	11,572	670	291
523 Residential Construction	9,526	1,719	120
555 Other Real Estate and Financial Services	9,526	1,718	120
<u>2. FINAL DEMAND CATEGORIES</u>			
20030 Recreation, Sports and Camping Equipment	29,751	2,800	36
TOTAL	148,506	9,504	1,449

APPENDIX C

ESTIMATION OF THE PROVINCIAL INDIRECT TAX REVENUE LESS SUBSIDIES

The purpose of this appendix is to outline the procedures and assumptions used to estimate the provincial indirect tax revenue less subsidies generated by angler expenditures on B.C.'s freshwater sportfishery during 1985. During 1985 the provincial government had several sources of indirect tax revenue in force, not all of which were included in the estimation of total indirect tax revenue. Indirect taxes included in the revenue estimation were the Social Services Tax, the Hotel Room Tax, and the Gasoline Tax. Also included as an indirect tax source was the Liquor Distribution Branch's net markup on the sale of alcoholic beverages. Not included, due to data limitations, were the Motive Fuel Use Tax, the Tobacco Tax, and the Insurance Premium Tax. Nor were any revenues generated by any property taxes included.

The input-output model expenditure categories listed in Table B-5 and B-6 were examined to see which categories would be subject in whole or in part to the indirect taxes included in the revenue estimation procedure. Table C-1 lists the input-output categories selected, the assumed tax rate for each category, and the percentage of the total expenditures in that category which was assumed to be taxable. For most categories the Social Service Tax rate and the Hotel Room Tax rate of 7% was used. For category 20002 - Alcoholic Beverages the Liquor Distribution Branch's net markup of 35% was also added (see Liquor Distribution Branch, 1986). The Gasoline Tax rate during 1985 was 20% of the pretax Vancouver retail rate which was 8.42¢ per litre which was assumed to translate to a tax rate of 16.7%. For categories 523 - Residential Construction and 20025 - Auto Repair and Parts only the material portion and not the labour portion is taxable. It was assumed for both categories that 50% of total expenditures on those categories was for materials. Under the Social Service Tax, meals under \$7 are exempt from the tax. To account for this it was assumed that only 80% of expenditures on category 570 - Meals was taxable. Table C-2 presents the estimated indirect tax revenue from angler expenditures during 1985 based on the assumptions described above.

In order to have a complete picture of the impact angler expenditures have on provincial indirect tax revenue it is necessary to subtract any provincial subsidy payments which may be attributable to the angler expenditures. The calculation of provincial subsidies attributable to angler expenditures was done based on the ratio of total provincial subsidies to total provincial GDP in 1984 which is the latest available data (Central Statistics Bureau, 1987). Provincial subsidies during 1984 were \$529 million and GDP at market prices was \$49,974 million. Applying the ratio of these two figures to the estimated direct impact of angler expenditures on provincial GDP given in Table 3-5 yields the estimated provincial subsidies due to angler expenditures shown in Table C-3 which also shows the net provincial revenue from indirect taxes less subsidies.

TABLE C-1
TAX RATE AND PERCENTAGE OF EXPENDITURE ASSUMED TAXED, 1985

INPUT-OUTPUT CATEGORY	TAX RATE	PERCENT OF EXPENDITURE TAXED
184 Clothing	7%	100%
352 Pleasure and Sports Craft	7%	100%
355 Trucks, Chassis and Tractors	7%	100%
508 Sport Fishing and Hunting Equipment	7%	100%
523 Residential Construction	7%	50%
569 Accommodation Services	7%	100%
570 Meals	7%	80%
577 Rental of Automobiles and Trucks	7%	100%
20002 Alcoholic Beverages	7% + 35%	100%
20025 Auto Repair and Parts	7%	50%
20026 Gasoline, Oil and Grease	16.7%	100%
20030 Recreation, Sports and Camping Equipment	7%	100%

TABLE C-2
ESTIMATED INDIRECT TAXES FROM ANGLER EXPENDITURES, 1985
(Thousands of 1985 Dollars)

INPUT-OUTPUT CATEGORY		RESIDENTS	NONRESIDENT CANADIAN	NONRESIDENT ALIEN	TOTAL
184	Clothing	320.3	14.1	7.9	342.3
352	Pleasure and Sports Craft	2,318.4	147.6	18.4	2,484.3
355	Trucks, Chassis and Tractors	3,126.8	8.2	31.5	3,166.5
508	Sport Fishing and Hunting Equipment	1,255.6	81.4	56.9	1,394.0
523	Residential Construction	311.6	56.2	3.9	371.8
569	Accommodation Services	236.9	73.2	160.3	470.4
570	Meals	237.9	74.4	88.0	400.3
577	Rental of Automobiles and Trucks	343.2	28.2	23.9	395.5
20002	Alcoholic Beverages	3,161.0	379.1	309.1	3,849.2
20025	Auto Repair and Parts	172.1	14.4	13.6	200.1
20026	Gasoline, Oil and Grease	5,295.9	399.1	325.9	6,020.8
20030	Recreation, Sports and Camping Equipment	1,946.3	183.2	2.4	2,131.8
TOTAL		18,726.1	1,459.1	1,041.7	21,226.9

TABLE C-3
ESTIMATED PROVINCIAL INDIRECT TAX REVENUE LESS SUBSIDIES, 1985
(Thousands of 1985 Dollars)

	RESIDENTS	NONRESIDENT CANADIANS	NONRESIDENT ALIENS	TOTAL
Indirect Taxes	18,726.1	1,459.1	1,041.7	21,226.9
Provincial Subsidies	810.5	87.5	86.5	984.5
TOTAL	17,915.6	1,371.6	955.2	20,242.4

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